

WHAT IS CLAIMED IS:

- 1                    1.        An apparatus for the optoelectronic detection of switch  
2 positions of a mechanically actuatable switch element, the switch element being  
3 movable in switch position steps in a switch direction with each switch position step  
4 corresponding to a switch position of the switch element, the apparatus comprising:  
5                    a plurality of photoelectric receivers each being arranged at a distance  
6 correspondingly from each other of a switch position step in the switch direction of  
7 the switch element;  
8                    a light source for exposing the receivers to light; and  
9                    a shutter coupled to the movement of the switch element to move  
10 relative to the receivers and the light source as the switch element moves in the  
11 switch direction between switch positions;  
12                    wherein the state of one of the receivers changes between an exposed  
13 state in which the receiver is exposed to the light source and a shaded state in which  
14 the shutter shades the receiver from the light source when the switch element moves  
15 in the switch direction from one switch position to an adjacent switch position.
- 1                    2.        The apparatus of claim 1 wherein the switch element is  
2 movable in switch position steps in a second switch direction with each switch  
3 position step in the second switch direction corresponding to a switch position of the  
4 switch element, the apparatus further comprising:  
5                    a second plurality of receivers each being arranged at a distance  
6 correspondingly from each other of a switch position step in the second switch  
7 direction of the switch element;  
8                    a second shutter coupled to the movement of the switch element to  
9 move relative to the second plurality of receivers and the light source as the switch  
10 element moves in the second switch direction between switch positions;  
11                    wherein the state of one of the second plurality of receivers changes  
12 between an exposed state in which the receiver is exposed to the light source and a  
13 shaded state in which the second shutter shades the receiver from the light source  
14 when the switch element moves in the second switch direction from one switch  
15 position to an adjacent switch position.

1                   3.     The apparatus of claim 1 wherein the switch element is  
2 supported in a rotatable manner about an axis wherein:  
3                   the plurality of receivers are located in a region of an intersection of  
4 the axis and the shutter has a curved surface.

1                   4.     The apparatus of claim 1 wherein:  
2                   the light source is an infrared (IR) light source and the receivers are  
3 IR sensitive receivers having filters which pass IR light.

1                   5.     The apparatus of claim 1 further comprising:  
2                   a binary decoding circuit for generating an output signal based on the  
3 states of the receivers.

1                   6.     The apparatus of claim 1 wherein:  
2                   the plurality of receivers form a light sensor array.

1                   7.     An apparatus for the optoelectronic detection of switch positions  
2 of a mechanically actuatable switch element, the switch element being movable in  
3 switch position steps in a switch direction with each switch position step  
4 corresponding to a switch position of the switch element, the apparatus comprising:  
5                   a photoelectric receiver;  
6                   a plurality of light sources for exposing the receiver to light, wherein  
7 each light source is arranged at a distance correspondingly from each other of a  
8 switch position step in the switch direction of the switch element; and  
9                   a shutter for shading the receiver from the light sources;  
10                  wherein the light sources and the receiver are coupled to the switch  
11 element to move relative to the shutter as the switch element moves in the switch  
12 direction between switch positions;  
13                  wherein the state of one of the light sources changes between an  
14 exposure state in which the light source exposes the receiver to light and a shaded  
15 state in which the shutter shades the receiver from the light source when the switch

16 element moves in the switch direction from one switch position to an adjacent switch  
17 position.

1 8. The apparatus of claim 7 wherein the switch element is  
2 movable in switch position steps in a second switch direction with each switch  
3 position step in the second switch direction corresponding to a switch position of the  
4 switch element, the apparatus further comprising:

5 a second photoelectric receiver;

6 a second plurality of light sources for exposing the second receiver  
7 to light, wherein each light source of the second plurality of light sources is  
8 arranged at a distance correspondingly from each other of a switch position step in  
9 the second switch direction of the switch element; and

10 a second shutter for shading the second receiver from the second  
11 plurality of light sources;

12 wherein the second plurality of light sources and the second receiver  
13 are coupled to the switch element to move relative to the second shutter as the  
14 switch element moves in the second switch direction between switch positions;

15 wherein the state of one of the light sources of the second plurality  
16 of light sources changes between an exposure state in which the light source exposes  
17 the second receiver to light and a shaded state in which the second shutter shades the  
18 second receiver from the light source when the switch element moves in the second  
19 switch direction from one switch position to an adjacent switch position.

1 9. The apparatus of claim 7 wherein the switch element is  
2 supported in a rotatable manner about an axis wherein:

3 the plurality of light sources are located in a region of an intersection  
4 of the axis and the shutter has a curved surface.

1 10. The apparatus of claim 7 wherein:

2 the light sources are infrared (IR) light sources and the receiver is an  
3 IR sensitive receiver having a filter which passes IR light.

1 11. The apparatus of claim 7 further comprising:

2                   a binary decoding circuit for generating an output signal based on the  
3 states of the receivers.

1                   12.     The apparatus of claim 8 wherein:  
2                   the receivers form a light sensor array.

1                   13.     A method for use with a light source for the optoelectronic  
2 detection of switch positions of a mechanically actuatable switch element, the switch  
3 element being movable in switch position steps in a switch direction with each  
4 switch position step corresponding to a switch position of the switch element, the  
5 method comprising:  
6                   arranging photoelectric receivers at a distance correspondingly from  
7 each other of a switch position step in the switch direction of the switch element;  
8 and  
9                   coupling a shutter to the switch element to move relative to the  
10 receivers and the light source as the switch element moves in the switch direction  
11 between switch positions such that the state of one of the receivers changes between  
12 an exposed state in which the receiver is exposed to the light source and a shaded  
13 state in which the shutter shades the receiver from the light source when the switch  
14 element moves in the switch direction from one switch position to an adjacent switch  
15 position.